

It will also be convenient to regard (with Professor Zittel) the first four families of the Rhabdophora as forming the artificial division of the *Monoprionida*, and the last four as constituting the similar division of the *Diprionida*.

Classification of the Lower Palæozoic Rocks.—The systems at present assigned to the Palæozoic age fall into two main groups—an older group, including the Cambrian, Ordovician, and Silurian systems, and a younger group, including the Devonian, Carboniferous, and Permian. The period during which the former were deposited may be denominated the *Lower Palæozoic or Proterozoic Age*; that in which the latter were laid down may be called the *Upper Palæozoic or Deuterozoic*. Broadly speaking, the Proterozoic rocks include all the sedimentary formations to which the name *Silurian* has at any time been applied by the most extreme adherents of the Murchisonian party in geology. With this extended interpretation the well-known generalization of Murchison that the Graptolites (Rhabdophora) are restricted to the Silurian system (Proterozoic period) still holds good. With one doubtful exception no Rhabdophora have hitherto been recorded from Deuterozoic rocks; their highest known limit in Britain lies near the horizon of the Aymestry Limestone. Until very recently no British species had been recognized in rocks of earlier date than the Lower Arenig of Hicks; but the interesting researches of Dr. C. Callaway show that Rhabdophora are certainly present in the highest zones of the Shropshire Cambrian. The strata, therefore, that will necessarily be referred to in this connexion are comprehended between the base of the Upper Cambrian and the summit of the Silurian. Our accumulated knowledge of the sequence and fossils of the rocks in question is as yet too scanty to enable geologists to attempt more than their provisional correlation. The arrangement of the known Graptolite-bearing rocks which appears to myself most fully to harmonize our present evidences is that given in the accompanying Table.

MISCELLANEOUS.

The Cochineals of the Elm: a new Genus, Ritsemia pupifera.

By M. LICHTENSTEIN.

THE discovery of a new species of cochineal living on the elm would not be a proper subject for communication to the Academy of Sciences, if the curious form of this new comer and the peculiar circumstances of its development did not render it a very strongly

marked distinct genus, forming the transition between the Coccidæ and the Phylloxerians, with which I have already frequently occupied the Academy. This is what I have been able to observe.

In the months of August and September, I saw, running about upon the trunk of a young elm (*Ulmus campestris*), some small red plant-lice 0.45 millim. in length, of an elongate-oval form, with six-jointed antennæ. These insects attach themselves in the crevices of the bark, and then gradually lose their Aphis-like form, to acquire that of a small flattened reniform gall or vesicle, as is the case in many Coccidæ. At this period the present form approaches the genera *Nidularia*, Targioni, and *Gossyparia*, Sign., inasmuch as it exudes a cottony mass underneath it, in which it deposits ovoid bodies which are not true ova, but analogous to what I have denominated *pupæ* in the Phylloxerians. In fact, in March these little ovoid bodies, which are of various dimensions, acquire traces of segmentation, which become more and more visible; and in April we see small red insects, which are the males, issue from the cottony mass.

Their antennæ, moniliform and of nine joints, are like those of the Coccidæ, especially those of *Gossyparia ulmi*, Sign. ("le Pro-gallinsecte de l'Orme" of Réaumur), which, however, have one joint more (ten); but in other respects the form is by no means that of the male Coccidæ, but that of the Phylloxerians. The head, thorax, and abdomen are united as in the sexual individuals of *Phylloxera* (or, I might add, of all the Pemphigians), and not separated as in the Coccidæ. Lastly, the little animal is completely apterous, destitute of a rostrum, and provided with a projecting penis; its length is 0.40 millim.

Here I cannot refrain from indicating a very curious fact in the males of the Coccidæ of the elm. Four different genera live upon this tree. Two of them, *Lecanium* and *Mytilaspis*, have the male form winged; a *Gossyparia* presents males with rudiments of wings; and, lastly, the one I am now describing, *Ritsemia*, has a perfectly apterous male.

A few days after the appearance of the males, the little ovoid pupæ which have remained in the cottony mass are developed in their turn, and furnish the female, which is a little larger than the male (0.45 millim.), and very similar to the form that appears in the month of August; only it has *eight* joints in the antennæ instead of *six*, and is therefore not the same biological phase.

Copulation takes place at the time; and I do not know what occurs between May and August. Notwithstanding this gap, I think it desirable to make known what I have observed, in order to call attention to the study of the plant-lice of the elm in general, which is still so incomplete. I know eight upon this tree, the four Coccidæ cited above and four Aphididæ—*Tetraneura ulmi*, *T. alba*, *Schizoneura ulmi*, and *S. lanuginosa*. These insects occur in millions upon every elm; the problem of their biology has been set ever since the time of Réaumur, and it is still to be solved. We are acquainted

with half the cycle of existence of each of them ; the other is still to be discovered.

I have given to the new insect the name of *Ritsemia*, in honour of M. C. Ritsema, the curator of the Museum at Leyden, who is well known in the entomological world. I have added the specific name *pupifera*, to recall to mind the mode of reproduction (*anthogenesis*), in which there intervenes a form furnishing male and female pupæ, from which the sexual individuals issue and copulate immediately. It is this form that I have called "Pseudogyne pupifère." This form exists among the *Phylloxeræ* and all the Pemphigians. I find it here among the Coccidæ.—*Comptes Rendus*, April 28, 1879, p. 870.

On Gordius, and on some Parasites of the Rat.

Prof. Leidy exhibited a curious knotted mass of living hairworms (*Gordius robustus*?) which had been sent to him by Dr. S. T. Roman, of Conowingo, Cecil Co., Md. The mass had been picked up in a gutter at the edge of a forest near Conowingo, on the rainy morning of Dec. 15, 1878. It contained fifty-two male individuals, and seven females. The former ranged from 8 to 25 centims. in length, by $\frac{1}{2}$ to $\frac{2}{3}$ of a millim. in thickness ; the latter range from 14 to 19 $\frac{1}{2}$ centims. in length, by 1 millim. in thickness. The females are generally of much lighter colour and more robust character than the males. In both sexes the body is most attenuated anteriorly ; but in the female the body is nearly as thick at the posterior extremity as it is at the middle. Some of the smaller males are pale brownish white ; but most of them, from the smallest to the largest, are of various shades of brown to chocolate-brown. The females are pale brownish to darker brownish. In both sexes the head forms a convex whitish eminence, encircled by a narrow black ring, from which a band of brown extends dorsally and ventrally along the body. The posterior end of the body is likewise of darker colour than the part just in advance.

The tail of the male makes a spiral turn inwardly and is furcate. The forks are short, curved, slightly divergent, blunt conical processes. Just in advance of their conjunction internally there exists an inverted crescentic fold of browner colour than the contiguous parts ; and immediately in advance is the genital pore. The interval of the caudal forks is smooth, or free from papillæ.

The tail of the female appears truncate, is bluntly rounded, feebly clavate, or slightly thicker than just in advance, and nearly as thick as the middle of the body. It presents a terminal pore, marked by a brown spot and encircled with a brown ring.

Under a moderate magnifying-power, the brown integument is minutely mottled with whitish spots, and it exhibits fine longitudinal and diagonal striation. In sunlight it is beautifully iridescent as in the earthworm.

The worms are still quite lively. When disentangled and left